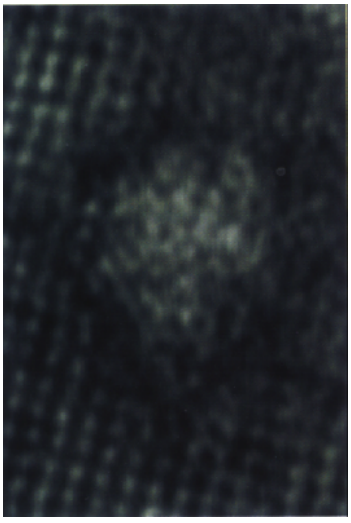
# ELECTRON MICROSCOPY CENTER FOR MATERIALS RESEARCH



**Atomic resolution image of defect in high-temperature superconductor, intentionally produced by ion irradiation to improve the electrical current carrying capacity.**

The Electron Microscopy Center for Materials Research (EMCMR) at Argonne National Laboratory includes the HVEM-Tandem Facility and the Analytical Microscopy Center. The HVEM-Tandem Facility instrumentation includes a 1.2 MeV high voltage electron microscope (HVEM) and a 300 keV intermediate voltage electron microscope (IVEM); both have been modified to permit a specimen under observation to be bombarded simultaneously with ion beams. This allows the irradiation-induced changes in material structure to be observed in situ. It is the only instrumentation of its type in the Western Hemisphere. The facility is open to outside researchers, whether collaborating with Argonne scientists or working independently.

The EMCMR's Analytical Microscopy Center instrumentation includes four transmission electron microscopes (TEM) for conventional TEM, ultra-high resolution, elemental microanalysis, and energy filtered electron diffraction. These instruments are available to outside users collaborating with Argonne scientists.

## ACCOMPLISHMENTS

A collaborative effort between IBM and Argonne National Laboratory is examining an ion-irradiation method to induce crystallization of noncrystalline, silicon-based compounds, which could lead to an alternative to existing laser- and thermal-annealing techniques.

Extensive electron microscopy investigations in collaboration with several universities and industries have yielded new understanding of the exciting properties of new high temperature superconductors.

In situ ion-beam irradiations, performed by Argonne scientists for Oak Ridge National Laboratory's Advanced Neutron Source Project, have demonstrated why $U_3Si$ is an unacceptable reactor fuel in certain situations.

**Principal investigator for HVEM-Tandem National User Facility, Charles Allen, operates a newly installed Hitachi Electron Microscope with in situ ion beam irradiation capability.**